इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 11124 (1984): Method for atomic absorption spectrophotometric determination of arsenic [CHD 1: Inorganic Chemicals]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 11124 - 1984
(Reaffirmed 2003)

Indian Standard

METHOD FOR ATOMIC ABSORPTION SPECTROPHOTOMETRIC DETERMINATION OF ARSENIC

UDC 543·422 : 546·19

© *Copyright* 1985

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 2 *March* 1985

Indian Standard

METHOD FOR ATOMIC ABSORPTION SPECTROPHOTOMETRIC DETERMINATION OF ARSENIC

Chemical Standards Sectional Committee, CDC 1

Chairman	*Representing*
Dr B. N. Mattoo	Maharashtra State Forensic Science Laboratory, Bombay
Members	
Dr S. K. Meghal (*Alternate* to Dr B. N. Mattoo)	
Shri K. D. Amre	National Organic Chemical Industries Ltd, Bombay
Shri S. B. Nanal (*Alternate*)	
Shri J. A. Ashtaputre	Ministry of Defence (DGI)
Shri P. K. Rao (*Alternate*)	
Shri K. M. Banerjee	National Test House, Calcutta
Shri P. K. Pain (*Alternate*)	
Shri D. S. Chadha	Directorate General of Health Services, New Delhi
Smt. Debi Mukherjee (*Alternate* I)	
Shri P. K. Dhingra (*Alternate* II)	
Dr M. S. Chadha	Bhabha Atomic Research Centre, Bombay
Chief Chemist	Central Revenues Control Laboratory, New Delhi
Deputy Chief Chemist (*Alternate*)	
Joint Director (Chemicals)	Department of Industries & Commerce, Madras
Deputy Director (MCL) Madras (*Alternate*)	
Shri R. Krishnamoorthy	Railway Board
Shri Bhupinder Singh (*Alternate*)	
Dr P. D. Malhotra	Geological Survey of India, Calcutta
Dr J. K. Nigam	Shriram Institute for Industrial Research, Delhi
Shri N. S. Birdie (*Alternate*)	
Shri Om Prasad	Century Rayon, Kalyan
Dr P. K. Pandya	Sarabhai M. Chemicals, Vadodara
Dr M. Pradhasaradhi	Regional Research Laboratory, Hyderabad
Dr J. Madhusudan Rao (*Alternate*)	
Dr D. C. Prashar	National Physical Laboratory, New Delhi
Dr A. K. Sarkar (*Alternate*)	
Dr G. Ramana Rao	Indian Drugs & Pharmaceutical, Calcutta
Shri Rooplal Shah (*Alternate*)	
Dr M. P. Sahakari	Itlab Pvt Ltd, Bombay
Shri S. S. Honavar (*Alternate*)	

(*Continued on page* 2)

© *Copyright* 1985
INDIAN STANDARDS INSTITUTION
This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
SHRI V. N. SEHGAL	Central Forensic Sciences (India) Ltd, New Delhi
SHRI V. S. BISARIA (*Alternate*)	
DR S. C. SHARMA	Central Indian Pharmacopoeia Laboratory, Ghaziabad
DR P. D. SETHI (*Alternate*)	
SHRI G. S. SHUKLA	Directorate of Marketing & Inspection, Nagpur
SHRI T. V. MATHEW (*Alternate*)	
DR V. SRINIVASAN	Glaxo Laboratories (India) Ltd, Bombay
SHRI P. MANSUKHANI (*Alternate*)	
PROF M. M. TAQUI KHAN	Central Salt and Marine Chemicals Research Institute, Bhavnagar
DR G. D. BHAT (*Alternate*)	
SHRI S. K. MATHUR, Director (Chem)	Director General ISI, (*Ex-officio Member*)

Secretary

SHRI M. BAKSHI GUPTA
Assistant Director (Chem), ISI

Indian Standard

METHOD FOR ATOMIC ABSORPTION SPECTROPHOTOMETRIC DETERMINATION OF ARSENIC

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 October 1984, after the draft finalized by the Chemical Standards Sectional Committee had been approved by the Chemical Division Council.

0.2 The atomic absorption spectrophotometric method is dependent on the fact that atoms in the ground state will absorb light of the same wavelength they emit when excited. When vapour containing arsenic (AsH_3) is introduced in the flame, the intensity of the transmitted radiation will decrease in proportion to the amount of ground state atoms present in the flame, that is, the extent of concentration of arsenic. A hollow cathode lamp made of the element to be determined provides the source of radiation. Vapour generation kit is used to provide AsH_3 vapour which is passed into the flame and the resultant arsenic absorption is seen as a peak signal. A monochromator eliminates the unwanted radiations and a photosensitive device measures the intensity of light. The absorbance is taken as the measure of concentration of the analyzed element.

0.3 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes the atomic absorption spectrophotometric method for the determination of arsenic by hydride generation technique.

---

*Rules for rounding off numerical values (*revised*).

2. OUTLINE OF THE METHOD

2.1 The sample is brought in solution form by dissolving in suitable acids. Arsenic is reduced by potassium iodide to trivalent state and volatile AsH_3 is generated by sodium borohydride. The vapour is passed into the flame and the resultant arsenic absorption is seen as a peak signal.

3. QUALITY OF REAGENTS

3.1 Unless specified otherwise, pure chemicals and deionized water shall be used.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

4. INTERFERENCES

4.1 One of the main sources of interferences in the determination of arsenic is the molecular absorption of flame gases at the extreme ultraviolet region of spectrum where the most sensitive lines of arsenic occur (193·7 nm and 197·2 nm). This non-atomic absorption can be estimated by means of continuum light source such as hydrogen lamp and the element absorption can be readily corrected. The standard addition technique takes care of most of the possible interferences in combination with background corrections. The background corrections are provided in all modern instruments.

5. APPARATUS

5.1 Atomic Absorption Spectrophotometer — Generally with the following parameters.

5.1.1 *Lamp Current* — 7 mA

5.1.2 *Support* — Air

5.1.3 *Fuel* — Acetylene

5.1.4 *Wavelength*

Wavelength	*Band Pass nm*
193·7	1·0
197·2	1·0

5.1.5 *Working Range* — 0·005 to 0·03 mg/l.

5.2 Vapour Generation Kit

6. REAGENTS

6.1 Concentrated Hydrochloric Acid — *See* IS : 265-1976*.

6.2 Concentrated Nitric Acid — *See* IS : 264-1976†.

6.3 Concentrated Sulphuric Acid — *See* IS : 266-1977‡.

6.4 Potassium Iodide — Solid.

6.5 Sodium Borohydride — Pellets.

6.6 Standard Arsenic Solution — Dissolve 1·320 3 g of As_2O_3 in a minimum volume of 20 percent NaOH and neutralize with nitric acid. Dilute to one litre with distilled water. This solution contains 1 000 µg/ml arsenic.

6.6.1 *Reduction of Arsenic from Pentavalent to Trivalent* — Arsenic As (V) shall be reduced to As (III) by addition of 20 percent (*m/v*) potassium iodide solution. Dissolve 20 g of potassium iodide 100 ml of water and add 1 ml of this solution to each 20 ml aliquot of samples. Reduction will be completed in about one hour at room temperature.

Alternatively, heat the sample at 50°C in a water bath for about 5 to 6 minutes to complete the reduction. Cool to room temperature before analysis.

Ensure that all standards and the analyte are in the correct valence state of As (III), otherwise the sample and standard will not match.

6.6.2 *Working Standards* — Dilute 1 ml of stock standard arsenic solution (*see* **6.6**) to one litre to give 1 ppm solution of arsenic. Make five standard dilutions by diluting 0·5, 1·0, 1·5, 2·0 and 2·5 ml of the solution to 20 ml using reagent blank.

7. PROCEDURE

7.1 Remove the cap from pellet dispenser and load with sodium borohydride pellet. Place the dispenser cap.

Raise the quartz tube and ignite the flame. Place the tube on the flame. Set the inert gas (nitrogen) supply regulator to 1·4 kg/cm^2 through the reaction vessel.

7.2 Optimise the response of the instrument by the adjustment of burner height and flame adjustment.

---

*Specification for hydrochloric acid (*second revision*).
†Specification for nitric acid (*second revision*).
‡Specification for sulphuric acid (*second revision*).

Remove the stopper assembly from reaction vessel and add 20 ml reagent blank in the reaction vessel. Replace the stopper assembly and switch on the stirrer. After 30 seconds turn the disperser knob through 180° to allow the pellet to drop. Turn the knob back and take the absorption reading.

Similarly take reading with 5 working standards (*see* **6.6.2**) and plot the graph in concentration *vs* absorbance.

Take sample in a reaction vessel, proceed as above and take the absorbance.

From the graph calculate the concentration of arsenic in ppm in the sample.

8. CALCULATION

8.1 Arsenic, percent by mass $= \frac{C \times V}{10^6} \times \frac{100}{M}$

where

C = concentration of arsenic in μg/ml in the final solution,
V = volume in ml in the final solution, and
M = mass in g of the sample in the final solution.